

***Verticillium dahliae* Causes Wilt on Sugar Beet Following Potato in Eastern North Dakota**

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Verticillium wilt of sugar beet (*Beta vulgaris* L.) has not previously been reported in the Red River Valley of Minnesota and North Dakota where both *Verticillium dahliae* Kleb and *V. albo-atrum* Reinke & Berthier cause wilt on potato (*Solanum tuberosum* L.) (3). In August 2003, sugar beet in four fields from eastern North Dakota (sown to potato in 2002) exhibited typical symptoms of *Verticillium* wilt. Symptoms included wilted foliage (Fig. 1), interveinal leaf chlorosis (Fig. 2A), "half-leaf" chlorosis or necrosis (Fig. 2B), and discolored vascular tissue with no external rot (Fig. 2C). Our objectives were to: (i) identify isolates from infected sugar beet and (ii) evaluate them for pathogenicity on sugar beet and potato.



Fig. 1. *Verticillium* wilt on sugar beet: wilting, chlorosis, and necrosis of foliage with no external root rot symptoms.



Fig. 2. Sugar beet infected with *Verticillium dahliae*: (A) interveinal chlorosis, (B) half-leaf necrosis, and (C) vascular discoloration in root.

Discolored vascular tissue was excised from symptomatic sugar beet roots. Ten single-spore isolates were identified as *V. dahliae* by Neil Anderson, Department of Plant Pathology, University of Minnesota, St. Paul. Auxotrophic nitrate-nonutilizing mutants of each isolate were paired with tester strains of specific vegetative compatibility groups (VCGs), assessed for heterokaryon formation (1), and identified as VCG 4A.

Roots of ten 3-week-old sugar beet plants were dipped in deionized water containing 10^6 /ml conidia for 1 min (2), transplanted into commercial soil in 9-cm square plastic pots (one plant per pot), arranged in a randomized complete block design (10 replicates per isolate) and incubated at $26 \pm 1^\circ\text{C}$, 14-h photoperiod. Five weeks later, plants were evaluated with a disease severity index of 0 to 3: 0 = healthy; 1 = older leaves wilting and/or necrotic with slight stunting; 2 = severe necrosis, stunting, and wilting of most leaves; and 3 = dead or dying plant. The pathogen was re-isolated from roots. The trial was repeated.

All isolates produced typical symptoms of *Verticillium* wilt on foliage and roots and averaged a disease rating of 2.0 across the two trials (range: 1.5 to 2.4). Non-inoculated controls were healthy. *V. dahlia* was re-isolated from all inoculated roots.

Roots of six 3-week-old potato plants (grown from disease-free mini-tubers 'Superior') were dipped in deionized water containing 10^6 /ml conidia for 15 min, transplanted into 15-cm diameter plastic pots (one per pot) containing commercial soil and incubated at $26 \pm 3^\circ\text{C}$, 14-h photoperiod for 7 weeks. Pots were arranged in a randomized complete block design (six replicates per treatment); the trial was repeated with four replicates. Plants were evaluated with a disease severity index of 1 to 6: 1 = healthy; 2 = slight chlorosis of lower leaves; 3 = extensive chlorosis of lower leaves; 4 = extensive chlorosis and some necrosis of leaves; 5 = severe stunting with chlorosis of entire plant; and 6 = plant dead or nearly dead. Re-isolations of *V. dahliae* were made from basal stem tissue.

Each isolate of *V. dahliae* produced symptoms of *Verticillium* wilt. The average disease rating was 5.3 across the two trials (range: 4.5 to 6.0). Control plants were disease-free. *V. dahliae* was re-isolated from inoculated plants.

This is the first report of *Verticillium* wilt of sugar beet in the Red River Valley caused by *V. dahliae* VCG 4A. This is a common, aggressive pathogen that causes *Verticillium* wilt of potato in the region (3). In the Red River Valley, about 19,000 acres of sugar beet were sown in 2007 following potato in 2006 (K. Wang, American Crystal Sugar Co., Moorhead, MN, *personal communication*). Where *Verticillium* wilt occurs on potato or sugar beet, close rotation with these crops should be avoided.

Literature Cited

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